

Bluebird Canyon Landslide of October 2, 1978,
Laguna Beach, California

1979

By
Russell V. Miller and Siang S. Tan

Reference:

Miller, R.V. and Tan, S.S., Bluebird Canyon Landslide of October 2, 1978,
Laguna Beach, California: 1979, California Division of Mines and Geology,
California Geology, v. 32, no. 1, p. 5-7.

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BLUEBIRD CANYON LANDSLIDE OF OCTOBER 2, 1978

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By

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At about 5:55 am on Monday morning, October 2, 1978, residents began to report unusual happenings in the area of Bluebird Canyon to the Laguna Beach Police Department. In the next few hours, 19 homes and parts of 14 others on the north side of Bluebird Canyon rode down the hill on a landslide at an initial rate of about 40 feet per hour, slowing finally to a few inches per day. By the end of the day it had been determined that a total of 50 homes had been destroyed or affected.

Although the Bluebird Canyon landslide covered an area of approximately 3.5 acres, it was suspected by geologists that it was but a portion of a larger, ancient landslide (figure 1). If this was true, the other homes sitting on the unmoved portion of the older slide then were endangered by the possibility of further landslide reactivation. Evidence of the slip surface of this older landslide was found during early examination of the headscarp area of the new slide (photo 1). The landform shown in photo 2 could then be interpreted as possibly the headscarp of this prehistoric slide. In any case the homes immediately uphill from the landslide were in danger from further degrading of the steep headscarp, which is as high as 35 feet.

On October 12, ten days after the slide began moving, a small section of ground gave way in the headscarp, taking with it another house (photo 3).

Tiltmeter monitoring equipment was installed on the upslope areas as part of the geological investigation being conducted for the City of Laguna Beach. This monitoring will continue until there is no further indication of on-going movement.

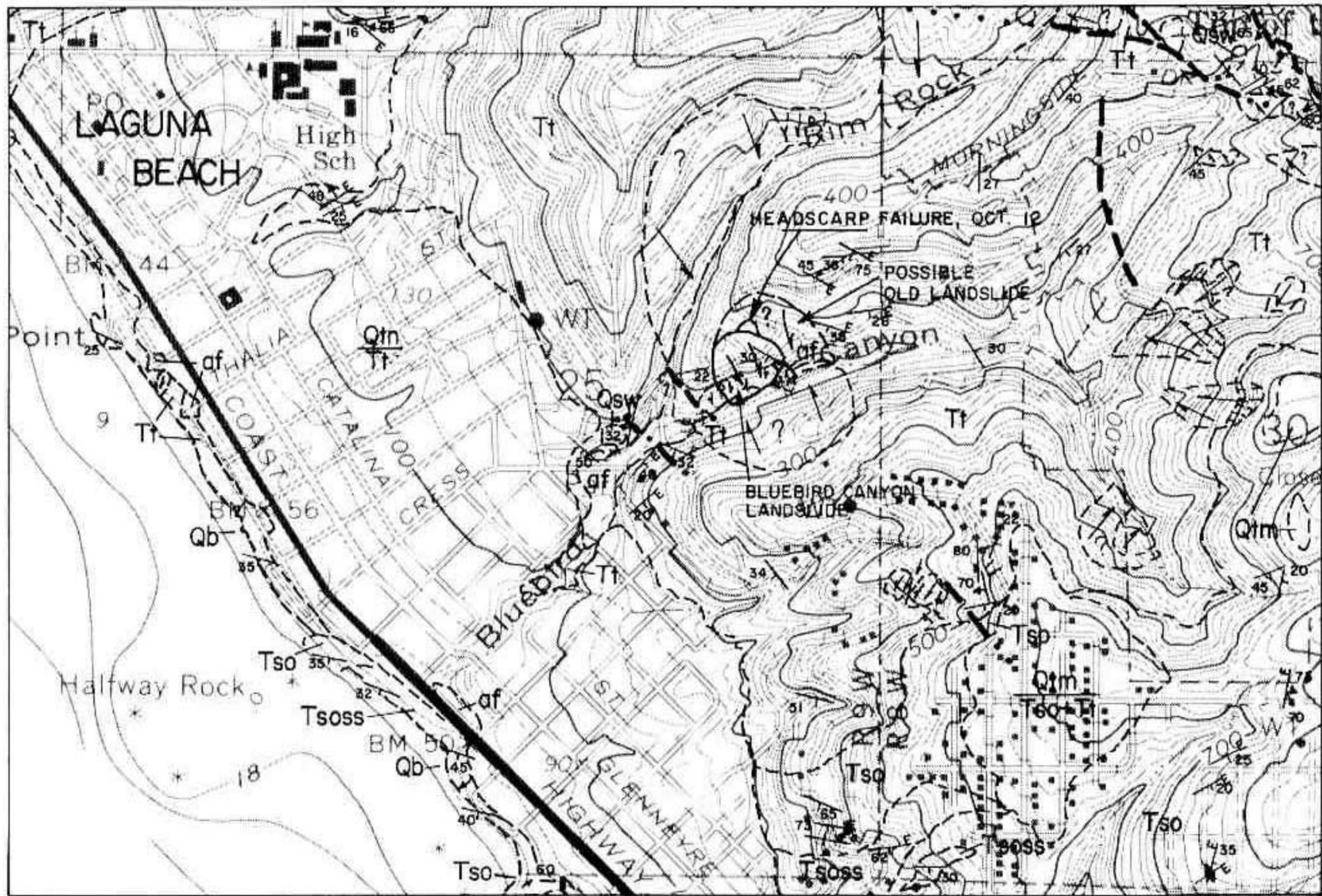
The Bluebird Canyon landslide was determined to be a "block glide" or "rock block" slide — a slide with little or no rotational movement. The slide mass remains fairly intact during its descent (photos 4, 5).

The basal slip surface of the slide apparently lies along a bedding plane in the underlying bedrock, as the attitude of the surrounding Topanga Formation (Miocene) is close to being parallel with the slope of the hillside. This unstable "dip slope" condition was recorded in previous geological surveys of the area; however, the tract of ill-fated homes was built long before these reports were published and prior to the institution of grading and building codes.

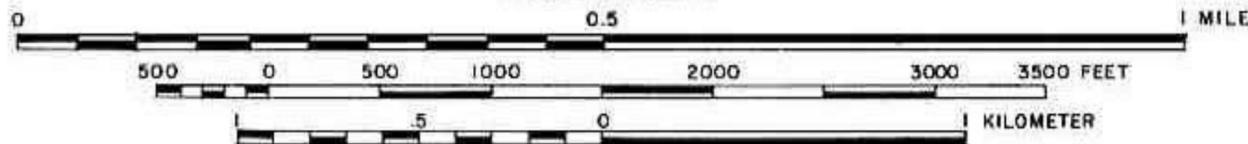
Another possible factor contributing to the cause of the landslide was extant ground water from the unusually heavy spring rains of March 1978. The final cause of any landslide is the accumulation of contributing factors until the limit of



Photo 1. Closeup of headscarp, looking northeast. Arrow pointing to area above concrete slab shows where evidence of older slide plane was found. Exposed bedrock in the headscarp is silty sandstone of the Miocene Topanga Formation. *Photo courtesy City of Laguna Beach.*



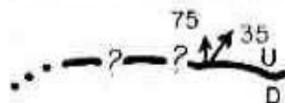
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SYMBOLS

...-?-?

Contacts, dotted where concealed; dashed where approximated; queried where inferred; solid where located with certainty.



Faults: dotted where concealed; dashed where approximated; queried where inferred; solid where certain; arrows show direction and numbers show amount of dip of fault plane and fault striations; U=upblock relative to downblock - D.

- 24 Attitude of bedding
- 24 E Attitude of bedding taken from excavation
- Vertical bedding
- 78 Attitude of shear surface
- 78 E Attitude of shear surface taken from excavation
- Vertical shear surface
- 80 Attitude of joint surface.

Qtm / Tt Developed area of artificial cut and fill with surficial unit thinly overlying bedrock unit



Bedrock landslide; arrows indicate direction of failure; scarp hachured where apparent; queried where uncertain; superimposed where failure has occurred on older landslide debris

EXPLANATION

SURFICIAL UNITS *

QUATERNARY	{	Holocene	af	Artificial fill and cut areas (shown superimposed over rock units) af=mappable artificial fill
			Qsw	Slopewash debris
			Qb	Beach sediments; Qbs- mainly sand; Qbg- mainly gravel; Qbs+g- mainly sand & gravel
			[Landslide debris symbol]	Landslide debris
			Pleistocene	{
Qtm	Marine terrace deposits (without nonmarine cover).			

BEDROCK UNITS *

TERTIARY	{	Miocene	Tso	San Onofre Breccia; Tso-ss - sandstone
			Tt	Topanga Formation

Figure 1. Bluebird Canyon landslide. Map adapted from California Division of Mines and Geology Special Report 127, Plate 1.

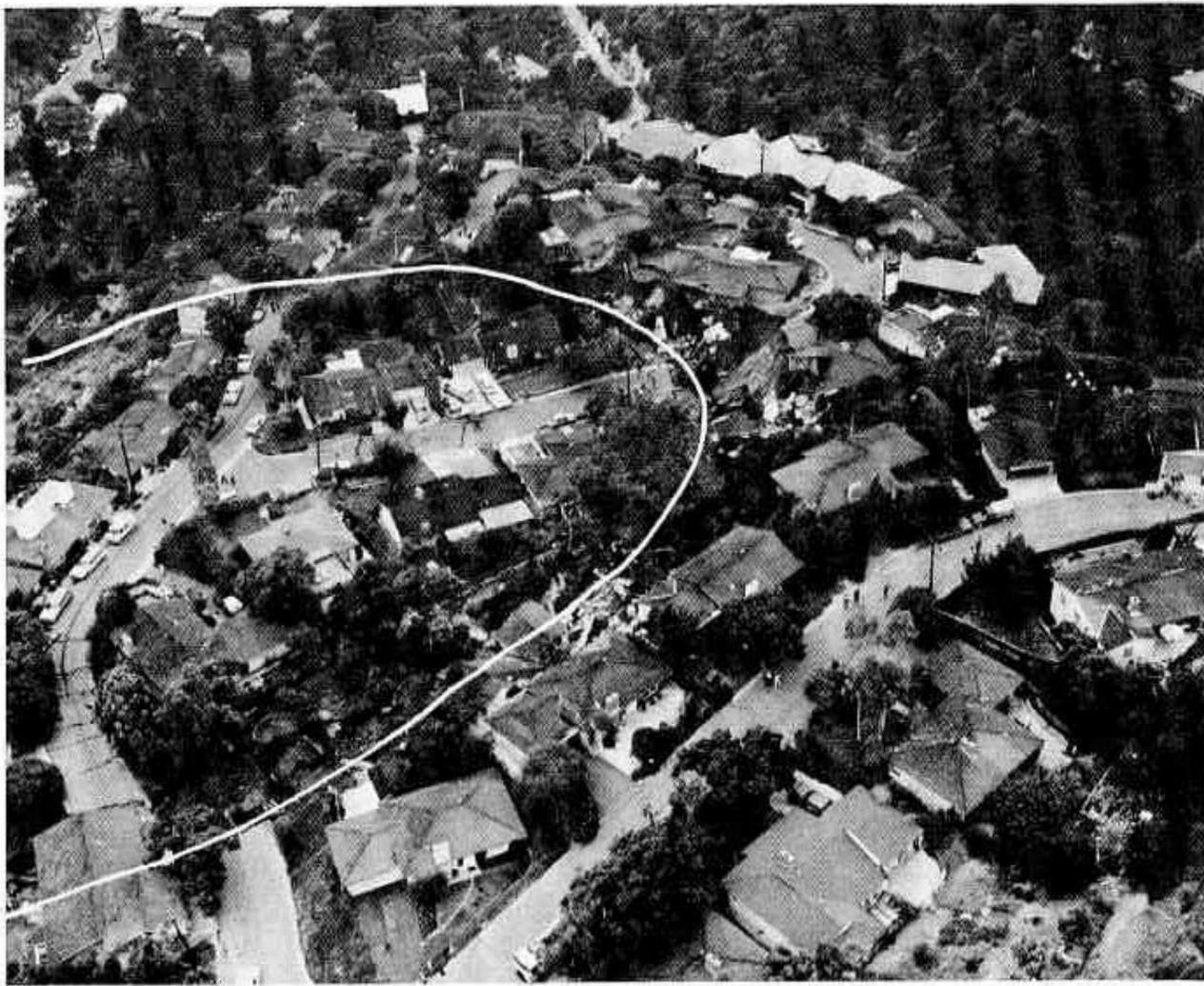
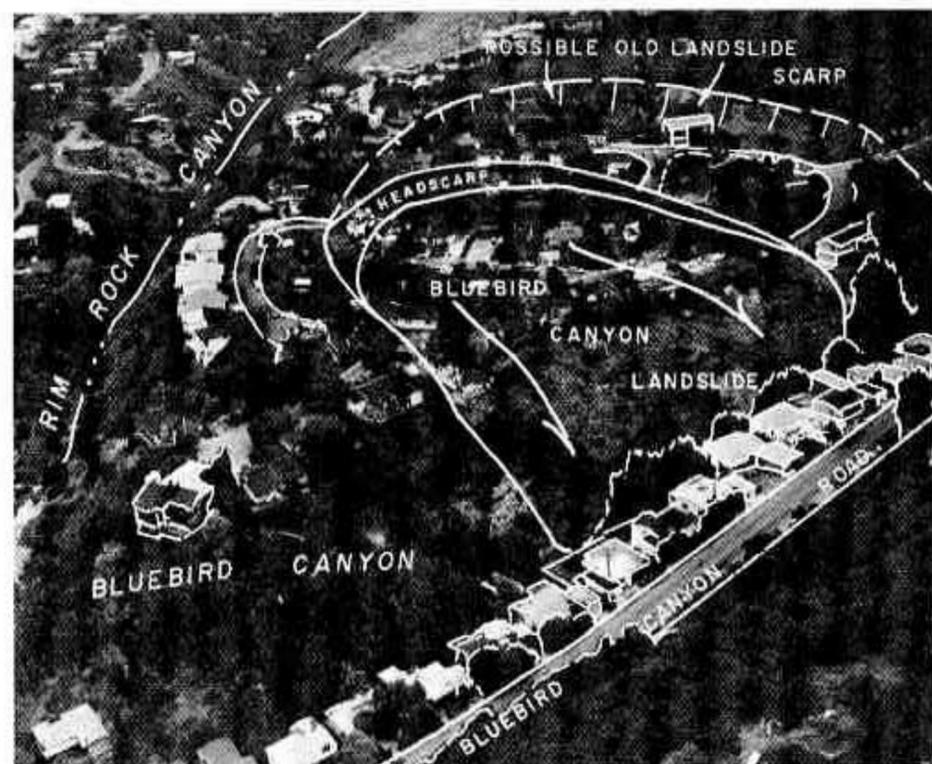


Photo 2. Aerial photo of Bluebird Canyon landslide, looking northeast. *Photo courtesy of City of Laguna Beach.*

failure is exceeded. In many cases the rapid input of a single factor can be cited, such as ground shaking during an earthquake or high rainfall; in this event, however, the causes at work were not obvious.

Photo 4. Aerial photo of slide looking southwest with Bluebird Canyon and Bluebird Canyon Road in the upper left corner. Solid line delineates the slide area. Note that the central portion of the slide is intact and the lack of tilting as evidenced by still-vertical telephone poles. *Photo courtesy City of Laguna Beach.*



ACKNOWLEDGMENTS

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Photo 3. Aerial photo of headscarp area taken the day of the slide (October 2, 1978). Dashed outline is the area which failed 10 days later, illustrating the instability of the ground behind the October 2 headscarp. View looking northeast. *Courtesy of City of Laguna Beach.*

REFERENCES

Leighton, F.B., 1969, Final geologic report, general planning study, City of Laguna Beach: F. Beach Leighton, La Habra, California.

Leighton and Associates, 1978, Preliminary geotechnical report, Bluebird Canyon landslide, Laguna Beach, California: Leighton and Associates, Irvine, California, October 14.

Tan, S.S. and Edgington, W.J., 1976, Geology and engineering geologic aspects of the Laguna Beach quadrangle, Orange County, California: California Division of Mines and Geology Special Report 127.



Photo 5. Aerial photo of easternmost toe area of slide. Note buttrressing effect of road fill ("af" on figure 1) where Oriole Drive crosses Bluebird Canyon. View toward the southwest. *Photo courtesy City of Laguna Beach.*